WHAT IS CLAIMED IS:

1. A method for acquisition of a received pulse position modulated impulse signal packet including a plurality of repeating short acquisition code sequences, the repeating short acquisition code sequences each defined by a short acquisition code, the method comprising the steps of:

a. sampling the received signal at a plurality of times in accordance with the short acquisition code, an acquisition code offset, and a frame time offset to produce a sequence of samples corresponding to the acquisition code offset;

b. accumulating the sequence of samples to produce a ramp value corresponding to the acquisition code offset;

c. concurrently performing steps (a.) and (b.) for each of a plurality of different acquisition code offsets, thereby producing a plurality of ramp values each corresponding to one of the different acquisition code offsets;

d. determining whether a threshold is satisfied based on the plurality of ramp values; and

e. adjusting the frame time offset and repeating steps (a.) through (d.) using the adjusted frame time offset if the threshold is not satisfied.

2. The method of claim 1, further comprising the step of:

f. determining an actual acquisition code offset based on the plurality of ramp results if the threshold is satisfied.

3. The method of claim 1, wherein course frame alignment and code synchronization to the length of the short acquisition code are achieved when the threshold is satisfied.

4. The method of claim 1, wherein the received impulse signal packet includes at least one ratchet code sequence following at last one of the plurality of repeating short acquisition code sequences, wherein the at least one ratchet code sequence is defined by a ratchet code, and wherein each

ratchet code sequence is greater in length than each repeating short acquisition code sequence, the method further comprising the following steps after the threshold has been satisfied:

f. sampling the received signal at a plurality of times in accordance with the ratchet code and a code boundary, to produce a sequence of samples corresponding to the code boundary;

g. combining the sequence of samples to produce a ratchet ramp value corresponding to the code boundary;

h. concurrently performing steps (f.) and (g.) for each of a plurality of different code boundaries, thereby producing a plurality of ratchet ramp values each corresponding to one of the different code boundaries; and

i. determining whether a ratchet threshold is satisfied based on the plurality of ratchet ramp values; and

j. repeating steps (f.) through (i.) if the ratchet threshold is not satisfied,

wherein code synchronization to the length of the ratchet code is achieved when the ratchet threshold is satisfied.

5. The method of claim 4, wherein the performing of steps (f.) and (g.) for an n^{th} code boundary begins slightly later in time than the performing of steps (f.) and (g.) for $n-1^{th}$ code boundary.

6. The method of claim 5, wherein the performing of steps (f.) and (g.) for an n^{th} code boundary begins at an amount of time later than the performing of steps (f.) and (g.) for an $n-1^{th}$ code boundary, wherein the amount of time is based on a length of the short acquisition code sequence.

7. The method of claim 4, further comprising the steps of:

storing the short acquisition code; and

generating the ratchet code from the short acquisition code.

8. The method of claim 4, wherein the at least one rachet code sequence comprises a plurality of different ratchet code sequences, each different ratchet code sequence defined by a different ratchet code, the method further comprising repeating steps (f.) through (i.) for each different ratchet code.

9. The method of claim 8, further comprising the steps of:

storing the short acquisition code; and

generating each of the different ratchet codes from the short acquisition code.

10. The method of claim 4, further comprising the step of:

k. searching for a delimeter to thereby determine the beginning of a data payload of the impulse signal packet.

11. The method of claim 10, further comprising the following steps after the delimeter has been found:

l. receiving the data payload; and

m. demodulating symbols of the data payload.

12. The method of claim 10, wherein step k. comprises:

k1. sampling the received signal at a plurality of times in accordance with a longest ratchet code defining the longest ratchet code sequence of the at least one ratchet code sequence, to produce a sequence of samples corresponding to the longest ratchet code;

k2. combining the sequence of samples corresponding to the longest ratchet code, to produce a delimeter ramp value; and

k3. determining whether a delimeter threshold is satisfied based on the delimeter ramp value,

wherein the delimeter is considered found when the delimiter threshold is satisfied.

13. The method of claim 12, wherein the delimeter is a flipped version of the longest ratchet code.

14. The method of claim 12, further comprising the following steps after the delimeter has been found:

l. receiving the data payload; and

m. demodulating symbols of the data payload.

15. The method of claim 2, further comprising the following step after the threshold has been satisfied:

f. searching for one or more ratchet codes to achieve code alignment to the length of the longest of the one or more ratchet codes.

16. The method of claim 4, further comprising the step of initiating tracking of the received impulse signal after the threshold is satisfied and prior to beginning step (f.).

17. The method of claim 16, further comprising the step of building back ramp values based on the short acquisition code during steps (f.) through (i.), wherein the back ramp values are used for tracking of the received impulse signal.

18. The method of claim 1, further comprising the step of initiating tracking of the received impulse signal packet after the threshold is satisfied.

19. The method of claim 1, wherein step (d.) includes:

d.1. identifying a maximum ramp value and a next maximum ramp value based on the plurality of ramp values; and

d.2. determining whether the threshold is satisfied based on the maximum ramp value and the next maximum ramp value.

20. The method of claim 19, wherein the threshold is satisfied if the maximum ramp value is greater than a predetermined multiple of the next maximum ramp value.

21. The method of claim 19, wherein step (d.2.) comprises determining whether the threshold is satisfied is based on the following equation:

MaxR/NextR > C

wherein,

MaxR comprises the first largest ramp value,

NextR comprises the second largest ramp value, and

C comprises a predetermined value.

22. The method of claim 1, wherein step (d.) includes:

d.1. identifying a maximum ramp value and a next maximum ramp value based on the plurality of ramp values;

d2. determining a moving average of a mean variance associated with the plurality of ramp values; and

d3. determining whether the threshold is satisfied based on the following equation:

$$N \bullet MaxR / MA\ MeanV > C$$

wherein,

N comprises an integration length,

MaxR comprises the first largest ramp value,

MA Mean V comprises the moving average of the mean variance associated with the plurality of ramp values, and

C is a predetermined constant.

23. The method of claim 1, wherein each sample in the sequence of samples produced at step (a.) comprises a sample pair including an I sample

and a J sample, each J sample being produced at a predetermined delay after a respective I sample, such that the sequence of samples comprises a sequence of I samples and a sequence of J samples, and wherein step (b.) comprises:

b1. accumulating the sequence of I samples to produce an I ramp value;

b2. accumulating the sequence of J samples to produce a J ramp value; and

b3. producing the ramp value corresponding to the acquisition code offset based on the I ramp value and the J ramp value.

24. The method of claim 23, wherein the combining in step b3. comprises summing the squares of the I ramp value and the J ramp value to produce the ramp value corresponding to the acquisition code offset.

25. The method of claim 23, wherein the combining in step (b3.) comprises adding the absolute values of the I ramp value and the J ramp value to produce the ramp value corresponding to the acquisition code offset.

26. The method of claim 23, wherein the combining in step (b3.) comprises selecting the greater of the I ramp value and the J ramp value as the ramp value corresponding to the acquisition code offset.

27. The method of claim 23, wherein the predetermined delay is approximately equal to a quarter wavelength of an impulse of the received impulse signal packet.

28. The method of claim 1, wherein each acquisition code sequence comprises a time ordered series of frames that are defined by the short acquisition code, wherein the short acquisition code defines where one or more impulses are positioned within each frame of the time ordered series of frames, and wherein the short acquisition code also defines whether each of the one or more impulses is flipped or not flipped.

29. The method of claim 28, wherein:

step (a.) further comprises inverting the sequence of samples corresponding to the acquisition code offset to produce an additional sequence of samples corresponding to the acquisition code offset;

step (b.) further comprises accumulating the additional sequence of samples corresponding to the acquisition code offset to produce an additional ramp value corresponding to the acquisition code offset;

step (c.) further comprises, for each of the plurality of different acquisition code offsets, producing an additional ramp value; and

step (d.) comprises determine whether the threshold is satisfied based on the plurality of ramp values including the additional ramp values.

30. A method of acquiring a received impulse signal packet including a plurality of repeating short acquisition code sequences and at least one ratchet code sequence following at last one of the plurality of repeating short acquisition code sequences, the repeating short acquisition code sequences defined by a short acquisition code, the at least one ratchet code sequence defined by a ratchet code, and wherein each ratchet code sequence is greater in length than each repeating short acquisition code sequence, the method comprising the steps of:

a. concurrently searching the received impulse signal packet for the short acquisition code sequence in accordance with a frame time offset and each of a plurality of acquisition code offsets;

b. adjusting the frame time offset and repeating step (a.) if the short acquistion code sequence is not found;

c. initiating tracking of the received impulse signal packet after the short acquisition code sequence is found; and

d. concurrently searching the received impulse signal packet for a ratchet code sequence in accordance with each of a plurality of code boundaries.

31. The method of claim 30, further comprising the step of:

e. searching for a delimeter after the ratchet code sequence is found.

32. The method of claim 32, further comprising the step of:

f. demodulating a data payload of the packet after the delimeter is found, the data payload following the delimeter.

33. The method of claim 31, further comprising the step of:

f. detecting one or more command bits after the delimeter is found.

g. demodulating a data payload of the packet based on information included in the command bits, the data payload following the one or more command bits.

34. The method of claim 33, wherein the one or more command bits includes information relating to at least one of:

a data integration length; and

a modulation type.

35. The method of claim 30, wherein step (a.) comprises:

a1. sampling the received signal at a plurality of times in accordance with the short acquisition code, one of the plurality of acquisition code offsets, and the frame time offset, to produce a sequence of samples corresponding to the acquisition code offset;

a2. accumulating the sequence of samples to produce a ramp value corresponding to the acquisition code offset; and

a3. concurrently performing steps (a1.) and (a2.) for each of a plurality of different acquisition code offsets, thereby producing a plurality of ramp values each corresponding to one of the different acquisition code offsets; and

a.4. determining whether the short acquisition code is found based on the plurality of ramp values.

36. The method of claim 35, wherein step (b.) comprises adjusting the frame time offset and repeating step (a.) if the threshold is not satisfied.

37. The method of claim 36, wherein step (d.) comprises:

d1. sampling the received signal at a plurality of times in accordance with the ratchet code and one of the plurality of code boundaries, to produce a sequence of samples corresponding to the code boundary;

d2. combining the sequence of samples to produce a ratchet ramp value corresponding to the code boundary;

d3. concurrently performing steps (d1.) and (d2.) for each of a plurality of different code boundaries, thereby producing a plurality of ratchet ramp values each corresponding to one of the different code boundaries;

d4. determining whether a ratchet code sequence is found by determining whether a ratchet threshold is satisfied based on the plurality of ratchet ramp values; and

d4. repeating steps (d1.) through (d4.) if the ratchet threshold is not satisfied,

wherein code synchronization to the length of the ratchet code is achieved when the ratchet threshold is satisfied.

38. The method of claim 30, further comprising the steps of:

storing the short acquisition code; and

generating the ratchet code from the short acquisition code.

39. The method of claim 30, wherein the at least one rachet code sequence comprises a plurality of different ratchet code sequences, each different ratchet code sequence defined by a different ratchet code, and wherein step (d.) comprises concurrently searching the received impulse signal packet for a ratchet code sequence in accordance with one of the different rachet codes and a plurality of code boundaries, and repeating step (d.) for each of the different ratchet codes.

40. The method of claim 39, further comprising the step of:

e. searching for a delimeter after the ratchet code sequence corresponding to a last of the different ratchet codes is found.

41. A system for acquiring a received pulse position modulated impulse signal including a repeating short acquisition code sequence, comprising:

a plurality of correlators,

each correlator adapted to sample the received signal according to (i) the short acquistion code sequence, (ii) a frame time offset, and (iii) a different one a plurality of code offsets,

the plurality of correlators thereby producing a plurality of sequences of samples,

each sequence of samples corresponding to a different one of the plurality of code offsets;

a plurality of accumulators,

each accumulator adapted to accumulate one of the plurality of sequence of samples,

the plurality of accumulators thereby adapted to output a plurality of ramp values,

each ramp value corresponding to one of the plurality of code offsets;

a threshold detector adapted to determine whether a threshold has been satisfied based on the plurality of ramp values; and

a frame time offset adjustor adapted to adjust the frame time offset when the threshold has not been satisfied.

42. The system of claim 41, further comprising:

control logic adapted to determine an actual code offset based on the plurality of ramp results when the threshold has been satisfied.

43. The system of claim 41, wherein course frame alignment and code synchronization to the length of the short acquisition code are achieved when the threshold is satisfied.

44. The system of claim 41, wherein the received impulse signal packet includes at least one ratchet code sequence following at last one of the plurality of repeating short acquisition code sequences, wherein the at least one ratchet code sequence is defined by a ratchet code, and wherein each ratchet code sequence is greater in length than each repeating short acquisition code sequence, the system further comprising the following after the threshold has been satisfied:

45. The system of claim 44, further comprising:

a short acquisition code storer; and

a ratchet code generator for generating the ratchet code from the short acquisition code.

46. The system of claim 44, further comprising:

a device for searching for a delimeter to thereby determine the beginning of a data payload of the impulse signal packet.

47. A system for acquiring a received impulse signal packet including a plurality of repeating short acquisition code sequences and at least one ratchet code sequence following at last one of the plurality of repeating short acquisition code sequences, the repeating short acquisition code sequences defined by a short acquisition code, the at least one ratchet code sequence defined by a ratchet code, and wherein each ratchet code sequence is greater in length than each repeating short acquisition code sequence, the system comprising;

a. means for concurrently searching the received impulse signal packet for the short acquisition code sequence in accordance with a frame time offset and each of a plurality of acquisition code offsets;

b. an adjuster for adjusting the frame time offset and repeating searching the received impulse signal packet for the short acquisition code sequence in accordance with a frame time offset and each of a plurality of acquisition code offsets, if searching for the short acquistion code sequence is not found;

c. means for initiating tracking of the received impulse signal packet after the short acquisition code sequence is found; and

d. means for concurrently searching the received impulse signal packet for a ratchet code sequence in accordance with each of a plurality of code boundaries.

48. The system of claim 47, further comprising:

a means for searching for a delimeter after the ratchet code sequence is found.

49. The system of claim 48, further comprising:

a demodulator for demodulating a data payload of the packet after the delimeter is found, the data payload following the delimeter.

50. The system of claim 48, further comprising:

a means for detecting one or more command bits after the delimeter is found; and

a demodulator for demodulating a data payload of the packet based on information included in the command bits, the data payload following the one or more command bits.

51. The system of claim 50, wherein the one or more command bits includes information relating to at least one of:

a data integration length; and

a modulation type.

52. The system of claim 47, further comprising:

a memory for storing the short acquisition code; and

a means for generating the ratchet code from the short acquisition code.

53. A system for acquiring a received pulse position modulated impulse signal including a repeating short acquisition code sequence, comprising:

a plurality of correlators,

each correlator adapted to sample the received signal according to (i) the short acquistion code sequence, (ii) a frame time offset, and (iii) a different one a plurality of code offsets,

the plurality of correlators thereby producing a plurality of sequences of samples,

each sequence of samples corresponding to a different one of the plurality of code offsets;

a plurality of accumulators,

each accumulator adapted to accumulate one of the plurality of sequence of samples,

the plurality of accumulators thereby adapted to output a plurality of ramp values,

each ramp value corresponding to one of the plurality of code offsets;

a threshold detector adapted to determine whether a threshold has been satisfied based on the plurality of ramp values, said threshold detector using an acquisition logic algorithm; and

a frame time offset adjustor adapted to adjust the frame time offset when the threshold has not been satisfied.

54. The system of claim 53, wherein said acquisition logic algorithm include four fully programmable threshold equations.

55. The system of claim 54, wherein said equations have the following format:

$Register_1 * Term_1 * OP_1(Term_2 - Term_3) \quad <,>,=,\neq \quad Register_2 * Term_4 * OP_2(Term_5 - Term_6)$.

56. The system of claim 55, wherein each of the four threshold equations can be programmed such that terms 1-6 can select any one or more of the following quantities: 1st largest acquisition ramp, 2nd largest acquisition ramp, Maximum correlator variance, Minimum correlator variance, Mean correlator variance, Moving (historical) average of the mean correlator variance, Moving (historical) average of the minimum correlator variance, Constant value 1, or Constant value 0.

57. The system of claim 54, wherein the logic operators, OP_1 and OP_2, can be set to FORCE_ONE, FORCE_ZERO or NOP (no operation) and $Register_1$ and $Register_2$ are 12-bit user configurable registers.

58. The system of claim 54, wherein said equations are selected from the group of equations consisting of:

N * MaxR / MA_meanV > C;

MaxR / NextR > C;

Logic AND or OR of equation MaxR / NextR ≥C and N * MaxR / MA_meanV > C;

N * MaxR / MaxV > C;

N * (MaxR / MA_meanV) * (MinV / MaxV) > C;

N * (MaxR / MA_meanV) * [FORCE_ZERO(MinV - MA_MinV) / FORCE_ONE(MaxV - MA_MinV)] > C;

N * (MaxR - NextR) / MA_meanV > C; or

N * [(MaxR - NextR) / MA_meanV] * (MinV / MaxV) > C; and

wherein N represents the acquisition integration length and C is a programmable constant and wherein the FORCE_ZERO(x) function yields x for x ≥ 0 and 0 for x < 0 and the FORCE_ONE(x) function yields x for x ≥ 1 and 1 for x < 1.

59. The system of claim 54, wherein said equations are selected from the group of equations consisting of:

N * MaxR / MA_meanV $\geq$C;

MaxR / NextR $\geq$C;

Logic AND or OR of equation MaxR / NextR $\geq$C and N * MaxR / MA_meanV $\geq$C;

N * MaxR / MaxV $\geq$C;

N * (MaxR / MA_meanV) * (MinV / MaxV) $\geq$C;

N * (MaxR / MA_meanV) * [FORCE_ZERO(MinV - MA_MinV) / FORCE_ONE(MaxV - MA_MinV)] $\geq$C;

N * (MaxR - NextR) / MA_meanV $\geq$C; or

N * [(MaxR - NextR) / MA_meanV] * (MinV / MaxV) $\geq$C; and

wherein N represents the acquisition integration length and C is a programmable constant and wherein the FORCE_ZERO(x) function yields x for $x \geq 0$ and 0 for $x < 0$ and the FORCE_ONE(x) function yields x for $x \geq 1$ and 1 for $x < 1$.

60. A method for acquisition of a received pulse position modulated impulse signal packet including a plurality of repeating short acquisition code sequences, the repeating short acquisition code sequences each defined by a short acquisition code, the method comprising the steps of:

a. sampling the received signal at a plurality of times in accordance with the short acquisition code, an acquisition code offset, and a frame time offset to produce a sequence of samples corresponding to the acquisition code offset;

b. accumulating the sequence of samples to produce a ramp value corresponding to the acquisition code offset;

c. concurrently performing steps (a.) and (b.) for each of a plurality of different acquisition code offsets, thereby producing a plurality of ramp values each corresponding to one of the different acquisition code offsets;

d. determining whether a threshold is satisfied based on the plurality of ramp values, the threshold determined by using an acquisition logic algorithm; and

e. adjusting the frame time offset and repeating steps (a.) through (d.) using the adjusted frame time offset if the threshold is not satisfied.

61. The method of claim 60, wherein the acquisition logic algorithm include four fully programmable threshold equations.

62. The method of claim 61, wherein said equations have the following format:

$$Register_1 * Term_1 * OP_1(Term_2 - Term_3) \quad <,>,=,\neq \quad Register_2 * Term_4 * OP_2(Term_5 - Term_6).$$

63. The method of claim 62, wherein each of the four threshold equations can be programmed such that terms 1-6 can be any one or more of the following quantities: 1st largest acquisition ramp, 2nd largest acquisition ramp, Maximum correlator variance, Minimum correlator variance, Mean correlator variance, Moving (historical) average of the mean correlator variance, Moving (historical) average of the minimum correlator variance, Constant value 1, or Constant value 0.

64. The method of claim 62, wherein the logic operators, OP_1 and OP_2, can be set to FORCE_ONE, FORCE_ZERO or NOP (no operation) and $Register_1$ and $Register_2$ are 12-bit user configurable registers.

65. The method of claim 61, wherein said equations are selected from the group of equations consisting of:

N * MaxR / MA_meanV > C;

MaxR / NextR > C;

Logic AND or OR of equation MaxR / NextR ≥C and N * MaxR / MA_meanV > C;

N * MaxR / MaxV > C;

N * (MaxR / MA_meanV) * (MinV / MaxV) > C;

N * (MaxR / MA_meanV) * [FORCE_ZERO(MinV - MA_MinV) / FORCE_ONE(MaxV - MA_MinV)] > C;

N * (MaxR - NextR) / MA_meanV > C; or

N * [(MaxR - NextR) / MA_meanV] * (MinV / MaxV) > C; and

wherein N represents the acquisition integration length and C is a programmable constant and wherein the FORCE_ZERO(x) function yields x for x ≥ 0 and 0 for x < 0 and the FORCE_ONE(x) function yields x for x ≥ 1 and 1 for x < 1.

66. The method of claim 61, wherein said equations are selected from the group of equations consisting of:

N * MaxR / MA_meanV $\geq$C;

MaxR / NextR $\geq$C;

Logic AND or OR of equation MaxR / NextR $\geq$C and N * MaxR / MA_meanV $\geq$C;

N * MaxR / MaxV $\geq$C;

N * (MaxR / MA_meanV) * (MinV / MaxV) $\geq$C;

N * (MaxR / MA_meanV) * [FORCE_ZERO(MinV - MA_MinV) / FORCE_ONE(MaxV - MA_MinV)] $\geq$C;

N * (MaxR - NextR) / MA_meanV $\geq$C; or

N * [(MaxR - NextR) / MA_meanV] * (MinV / MaxV) $\geq$C; and

wherein N represents the acquisition integration length and C is a programmable constant and wherein the FORCE_ZERO(x) function yields x for $x \geq 0$ and 0 for $x < 0$ and the FORCE_ONE(x) function yields x for $x \geq 1$ and 1 for $x < 1$.

67. A threshold detector for a system for acquiring a received pulse position modulated impulse signal including a repeating short acquisition code sequence, said threshold detector adapted to determine whether a threshold has been satisfied based on the plurality of ramp values, said threshold detector using an acquisition logic algorithm comprising four fully programmable threshold equations.

68. The threshold detector of claim 67, wherein said equations have the following format:

$$Register_1 * Term_1 * OP_1(Term_2 - Term_3) \quad <,>,=,\neq \quad Register_2 * Term_4 * OP_2(Term_5 - Term_6).$$

69. The threshold detector of claim 67, wherein each of the four threshold equations can be programmed such that terms 1-6 can select any one or more of the following quantities: 1st largest acquisition ramp, 2nd largest acquisition ramp, Maximum correlator variance, Minimum correlator

variance, Mean correlator variance, Moving (historical) average of the mean correlator variance, Moving (historical) average of the minimum correlator variance, Constant value 1, or Constant value 0.

70. The threshold detector of claim 68, wherein the logic operators, OP_1 and OP_2, can be set to FORCE_ONE, FORCE_ZERO or NOP (no operation) and $Register_1$ and $Register_2$ are 12-bit user configurable registers.

71. The threshold detector of claim 67, wherein said equations are selected from the group of equations consisting of:

N * MaxR / MA_meanV > C;

MaxR / NextR > C;

Logic AND or OR of equation MaxR / NextR ≥C and N * MaxR / MA_meanV > C;

N * MaxR / MaxV > C;

N * (MaxR / MA_meanV) * (MinV / MaxV) > C;

N * (MaxR / MA_meanV) * [FORCE_ZERO(MinV - MA_MinV) / FORCE_ONE(MaxV - MA_MinV)] > C;

N * (MaxR - NextR) / MA_meanV > C; or

N * [(MaxR - NextR) / MA_meanV] * (MinV / MaxV) > C; and

wherein N represents the acquisition integration length and C is a programmable constant and wherein the FORCE_ZERO(x) function yields x for $x \geq 0$ and 0 for $x < 0$ and the FORCE_ONE(x) function yields x for $x \geq 1$ and 1 for $x < 1$.

72. The threshold detector of claim 67, wherein said equations are selected from the group of equations consisting of:

$N * MaxR / MA\_meanV \geq C$;

$MaxR / NextR \geq C$;

Logic AND or OR of equation $MaxR / NextR \geq C$ and $N * MaxR / MA\_meanV \geq C$;

$N * MaxR / MaxV \geq C$;

$N * (MaxR / MA\_meanV) * (MinV / MaxV) \geq C$;

$N * (MaxR / MA\_meanV) * [FORCE\_ZERO(MinV - MA\_MinV) / FORCE\_ONE(MaxV - MA\_MinV)] \geq C$;

$N * (MaxR - NextR) / MA\_meanV \geq C$; or

$N * [(MaxR - NextR) / MA\_meanV] * (MinV / MaxV) \geq C$; and

wherein N represents the acquisition integration length and C is a programmable constant and wherein the FORCE_ZERO(x) function yields x for $x \geq 0$ and 0 for $x < 0$ and the FORCE_ONE(x) function yields x for $x \geq 1$ and 1 for $x < 1$.